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Subject: Review of Cyanide Contamination at the ACS Site
Griffith, Indiana

Dear Mr. Hartwick:

Following are Roy F. Weston, Inc.'s (WESTON®) comments on the potential for release of cyanide at the Off-Site Containment Area of the ACS site. The comments are organized into the following three sections:

- Review of Remedial Investigation (RI) data on cyanide contamination.
- Discussion of potential for chronic adverse health effects based on RI data.
- Discussion of potential for release of HCN at levels that could cause acute effects.

RI Data

It is important to note that all of the cyanide data collected during the RI was for total cyanide rather than reactive cyanide (RI Report, Warzyn Engineering, Inc., September 1990). One of the difficulties in evaluating the fate, transport, and toxic effects of cyanide in general is that these properties vary greatly depending on the specific chemical form that is present. Cyanide most commonly exists as either hydrogen cyanide (HCN, a gas), simple

salts with alkali metals, or complexes with transition series metals. HCN gas can be acutely toxic. Alkalic metals salts (sodium or potassium cyanide) will very readily release HCN under acidic conditions. Complex metal cyanides are much less likely to release HCN and are much less toxic. Since total cyanide was measured at the ACS site during the RI, the potential for release of HCN could be as large as the measured concentration, or could approach zero.

The RI data on cyanide is summarized in Table 1. In general, the frequencies of detection were low. No cyanide was detected in surface water or sediment samples. Cyanide was detected in 1 out of 34 groundwater samples. The frequency of cyanide detection does increase somewhat for the soil samples. For the area of specific concern (Off-Site Containment Area), cyanide was detected in 4 out of 19 samples, ranging from 7.2 mg/kg to 31.3 mg/kg. The highest concentration of total cyanide detected anywhere on site was 70.7 mg/kg in the Still Bottoms/Treatment Lagoon.

Potential for Chronic Adverse Health Effects

Cyanide was included as a chemical of potential concern in the ACS baseline risk assessment. The results of the baseline risk assessment indicated that for all source areas and exposure scenarios examined, the hazard quotient for cyanide was less than 0.01 (a hazard quotient greater than 1.0 would suggest the potential for adverse health effects). For the Off-Site Containment Area, the hazard quotient for cyanide was 7.7E-04, suggesting little potential for adverse health effects under a future residential exposure scenario.

In order to place the cyanide contamination at the Off-Site Containment Area in perspective, WESTON has examined exposure to the maximum detected soil cyanide concentration (31.3 mg/kg) using U.S. EPA default exposure assumptions for residential exposure of an adult under chronic (seven years to lifetime) or subchronic (two weeks to seven years) conditions. An adult is assumed to typically ingest 100 mg/day of soil and dust. For cyanide to produce chronic or subchronic effects in an adult would require the ingestion of approximately 45,000 mg/day of this maximally contaminated soil. Alternatively, to produce a hazard quotient of 1 for an adult in a residential setting, the soil cyanide concentration would need to be 7,300 mg/kg (as compared to the maximum of 31.3 mg/kg detected).

Exposure to cyanide might also occur as a result of inhalation of contaminated dust, or inhalation of HCN gas. WESTON performed a brief, screening-level evaluation of the potential for adverse effects resulting from inhalation of cyanide-contaminated dust. The results indicated an insignificant potential for adverse effects resulting from exposure by this route. Inhalation exposure to HCN gas will be discussed in the next section.

Potential for Release of HCN

Although the effects of chronic exposure to cyanide occur at relatively low concentrations, it is the effects of acute exposure at higher concentrations, which includes death, that are often of greater concern at hazardous waste sites. In general, three conditions are required in order to generate a potentially hazardous HCN release:

1. The cyanide source must contain reactive cyanide.

2. Acid must be introduced into the cyanide containing materials.

3. Wind conditions are calm so as to allow the accumulation of HCN gas in the air above the release point.

The severity of the hazards associated with a hypothetical HCN release will be an unknown function of these three interrelated factors. For example, as the size or reactivity of a cyanide source increases, the potential for development of a hazardous exposure becomes less sensitive to local wind conditions. Based on the RI data, the potential for developing a hazardous release of HCN seems small at the Off-Site Containment Area.

Should you have any questions or comments, please do not hesitate to call.

Very truly yours,

ROY F. WESTON, INC.

Thomas P. Graan

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Enclosure

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Table 1

Summar of Cyanide Data from RI
ACS Site
Griffith, Indiana

Medium	Frequency of Detection	Total Cyanide		
		Minimum	Maximum	Units
Surface water	0/5	---	---	µg/L
Sediment	0/18	---	---	mg/kg
Groundwater				
Upper aquifer	1/24	10	10	µg/L
Lower aquifer	0/10	---	---	µg/L
Soil				
On-site containment	1/14	8.7	8.7	mg/kg
Still Bottoms/ Treatment Lagoon	3/11	5.0	70.7	mg/kg
Off-site containment	4/19	7.1	31.3	mg/kg
Kapica-Pazmey, surface	4/4	4.6	66.2	mg/kg
Kapica-Pazmey, subsurface	1/4	21.3	21.3	mg/kg